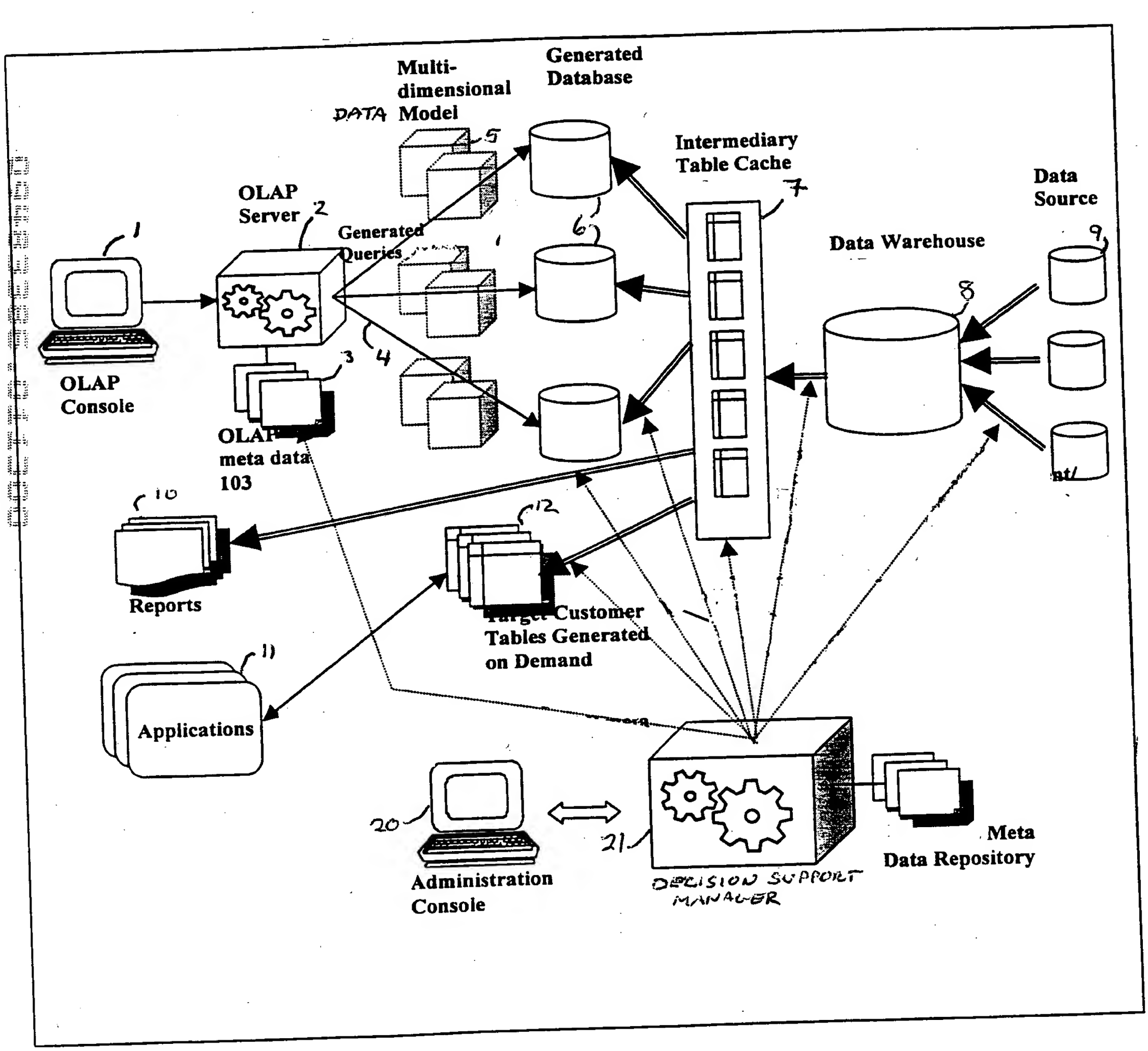

Multi-dimensional Model
DATA
Generated Database
Intermediary Table Cache
Data Source
OLAP Server
Generated Queries
Data Warehouse
OLAP Console
OLAP meta data 103
Reports
Target Customer Tables Generated on Demand
Applications
Administration Console
DECISION SUPPORT MANAGER
Meta Data Repository

Fig. 1A

DOCTOR SECRETED

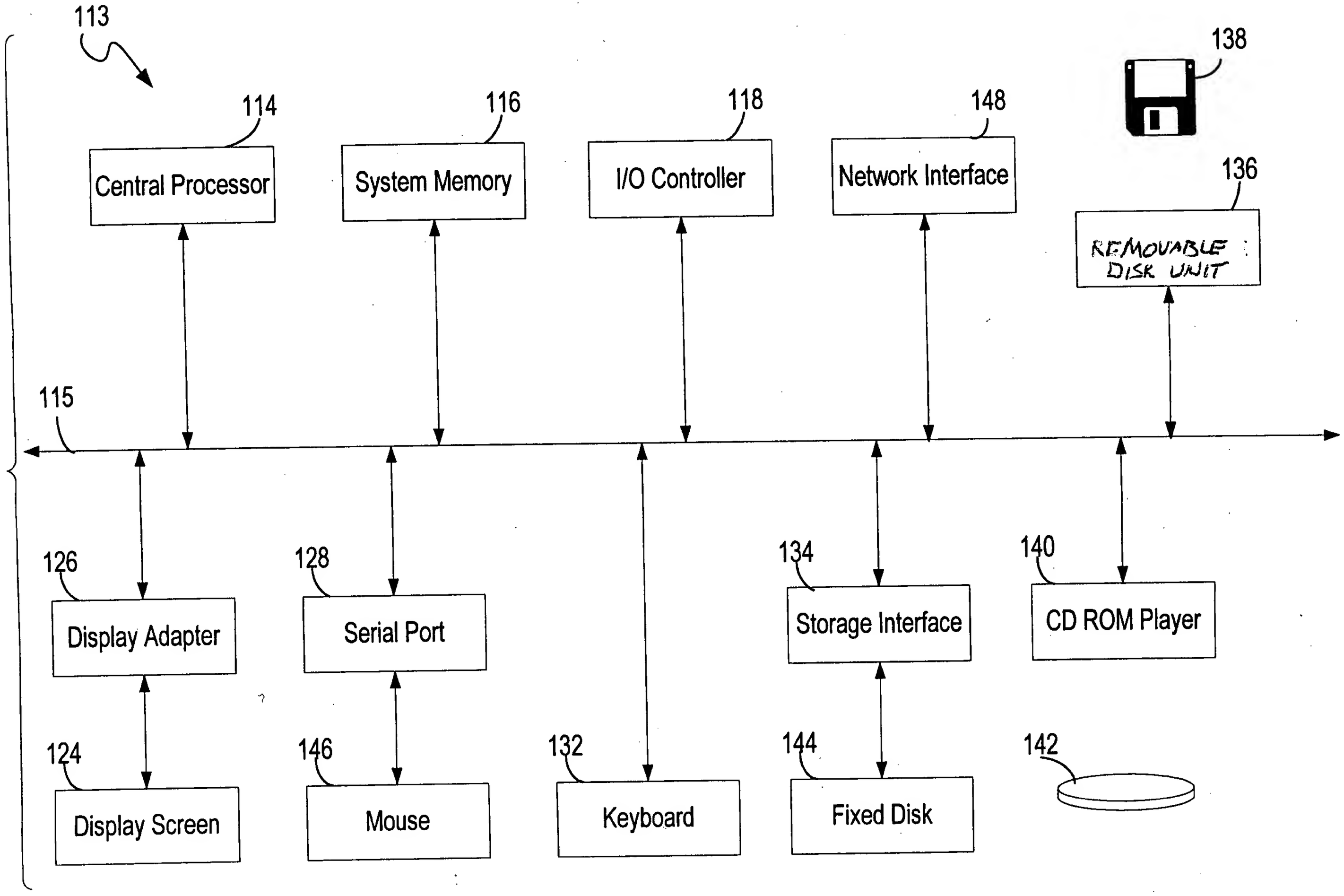


Fig. 1B

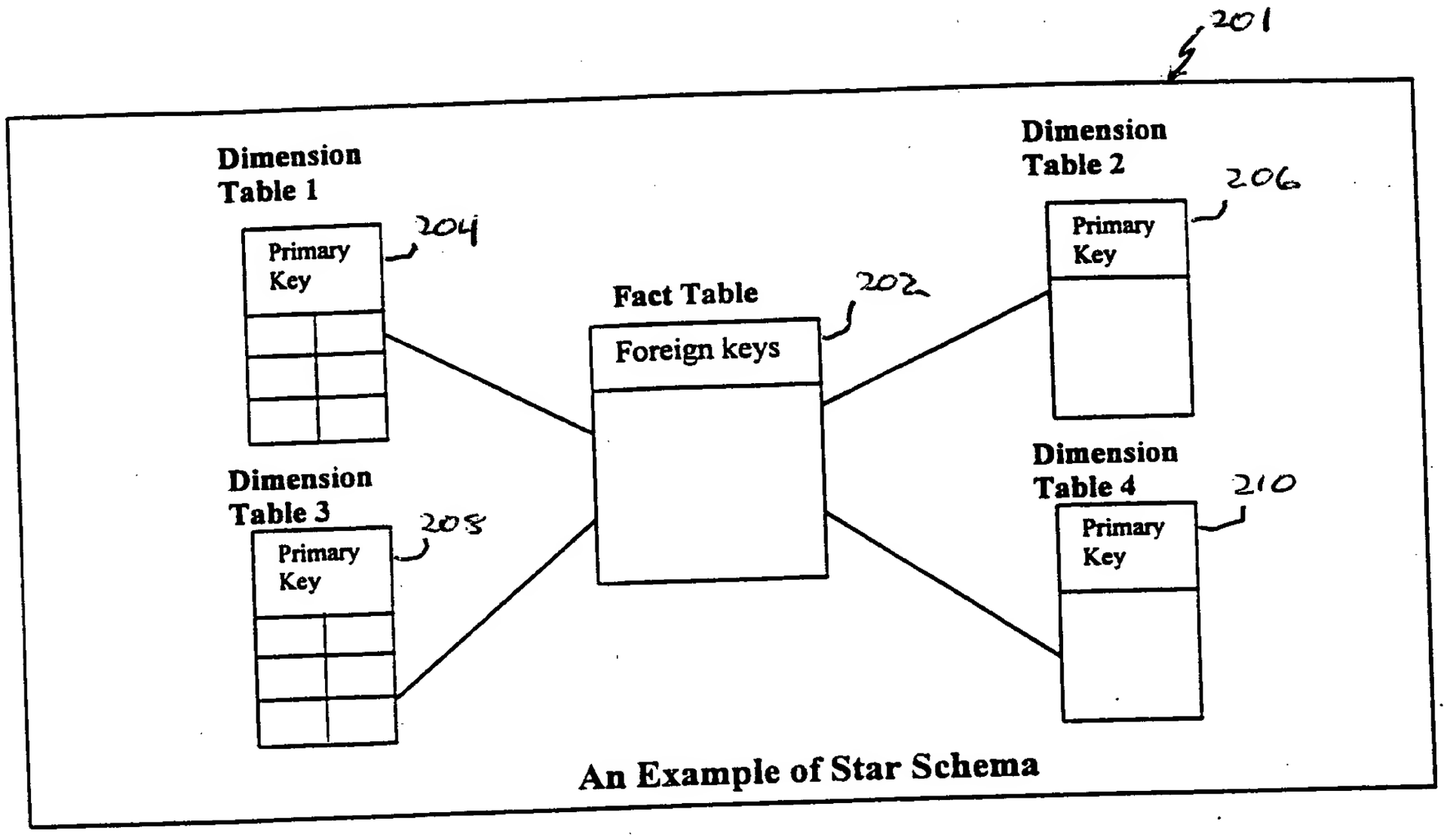

201
Dimension Table 1
Primary Key
204
Fact Table
Foreign keys
202
Dimension Table 2
Primary Key
206
Dimension Table 3
Primary Key
205
Dimension Table 4
Primary Key
210
An Example of Star Schema

Fig. 2A

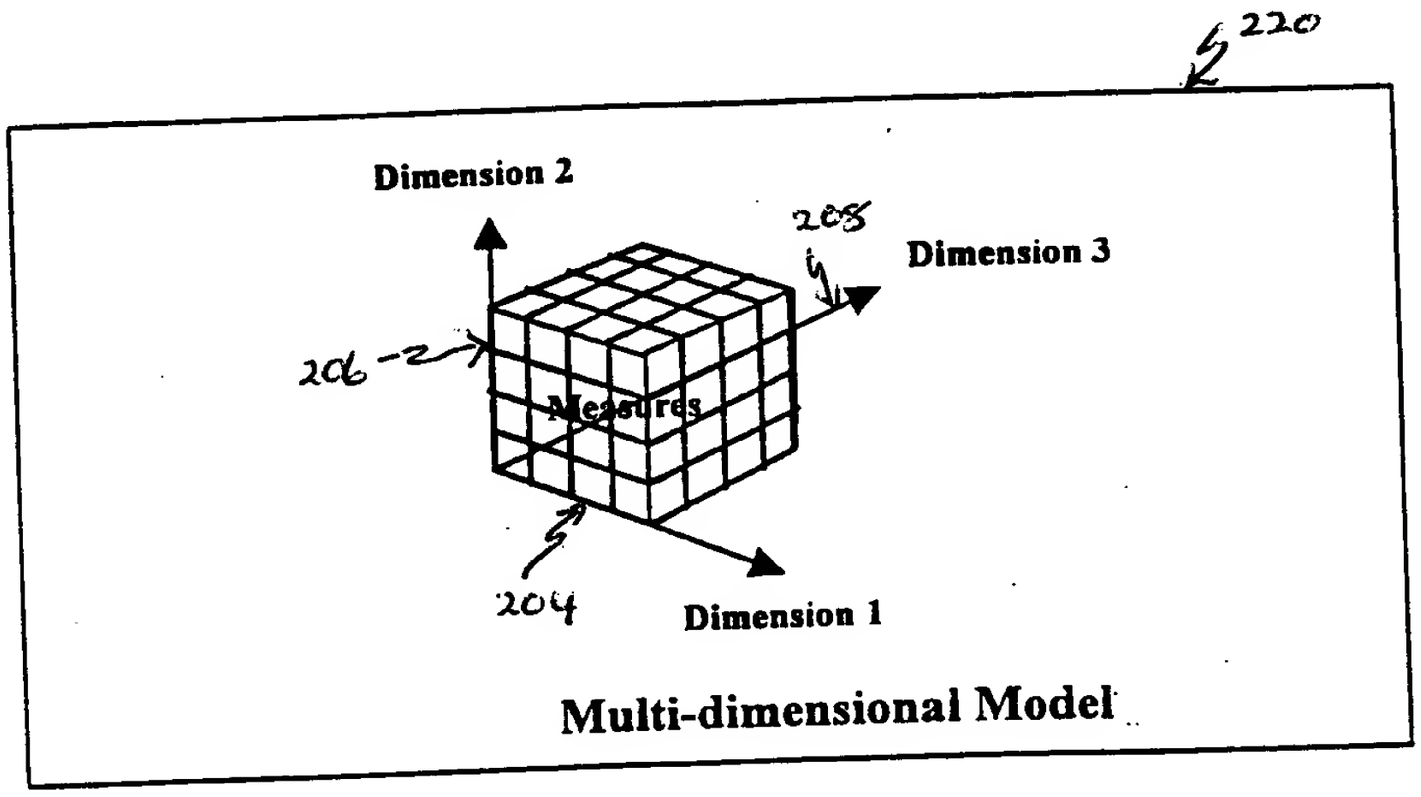

220
Dimension 2
208
Dimension 3
206-2
Measures
204
Dimension 1
Multi-dimensional Model

Fig. 2B

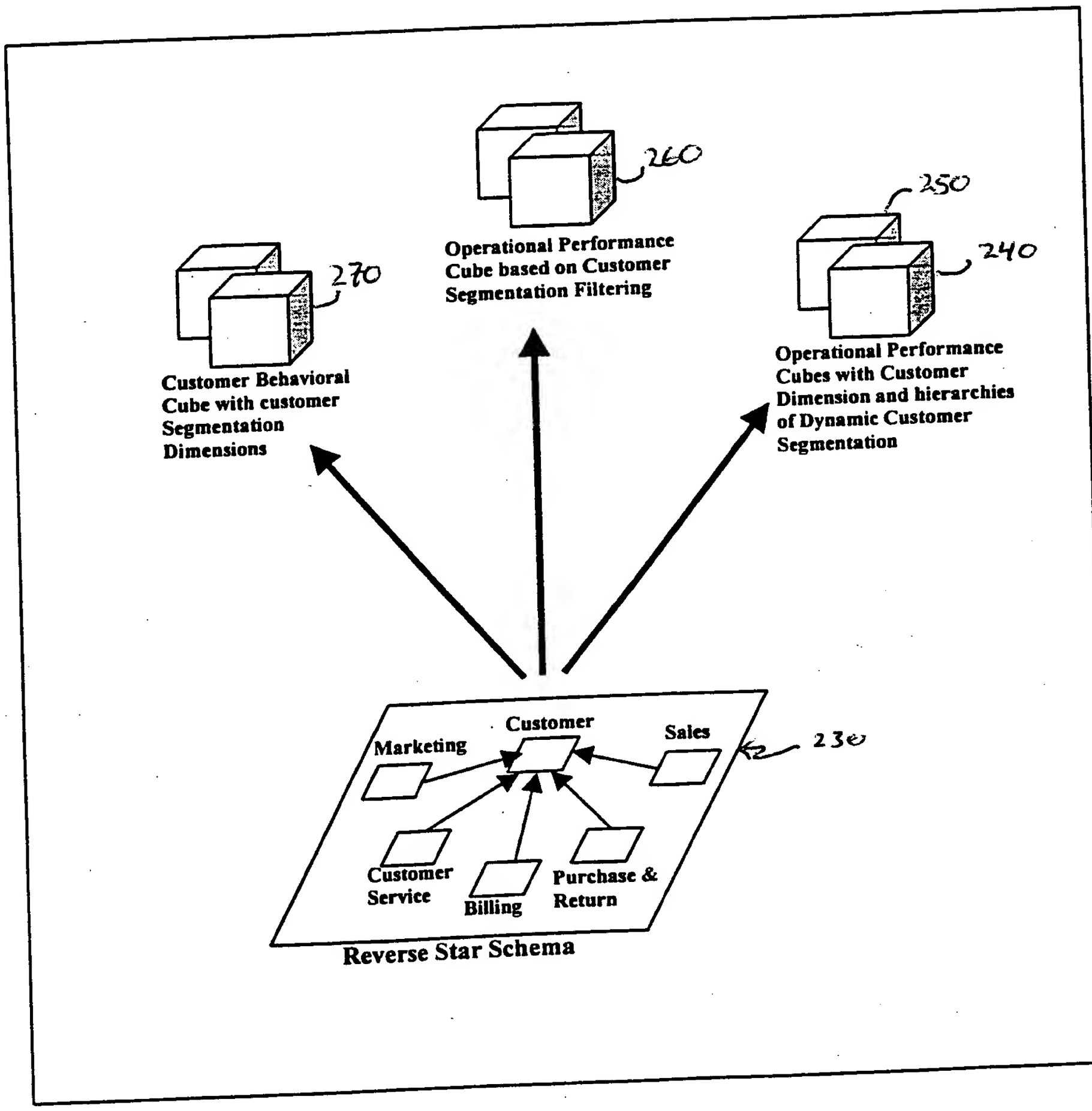

260
Operational Performance Cube based on Customer Segmentation Filtering
250
240
Operational Performance Cubes with Customer Dimension and hierarchies of Dynamic Customer Segmentation
270
Customer Behavioral Cube with customer Segmentation Dimensions
Customer
Marketing
Sales
230
Customer Service
Billing
Purchase & Return
Reverse Star Schema

Fig. 2C

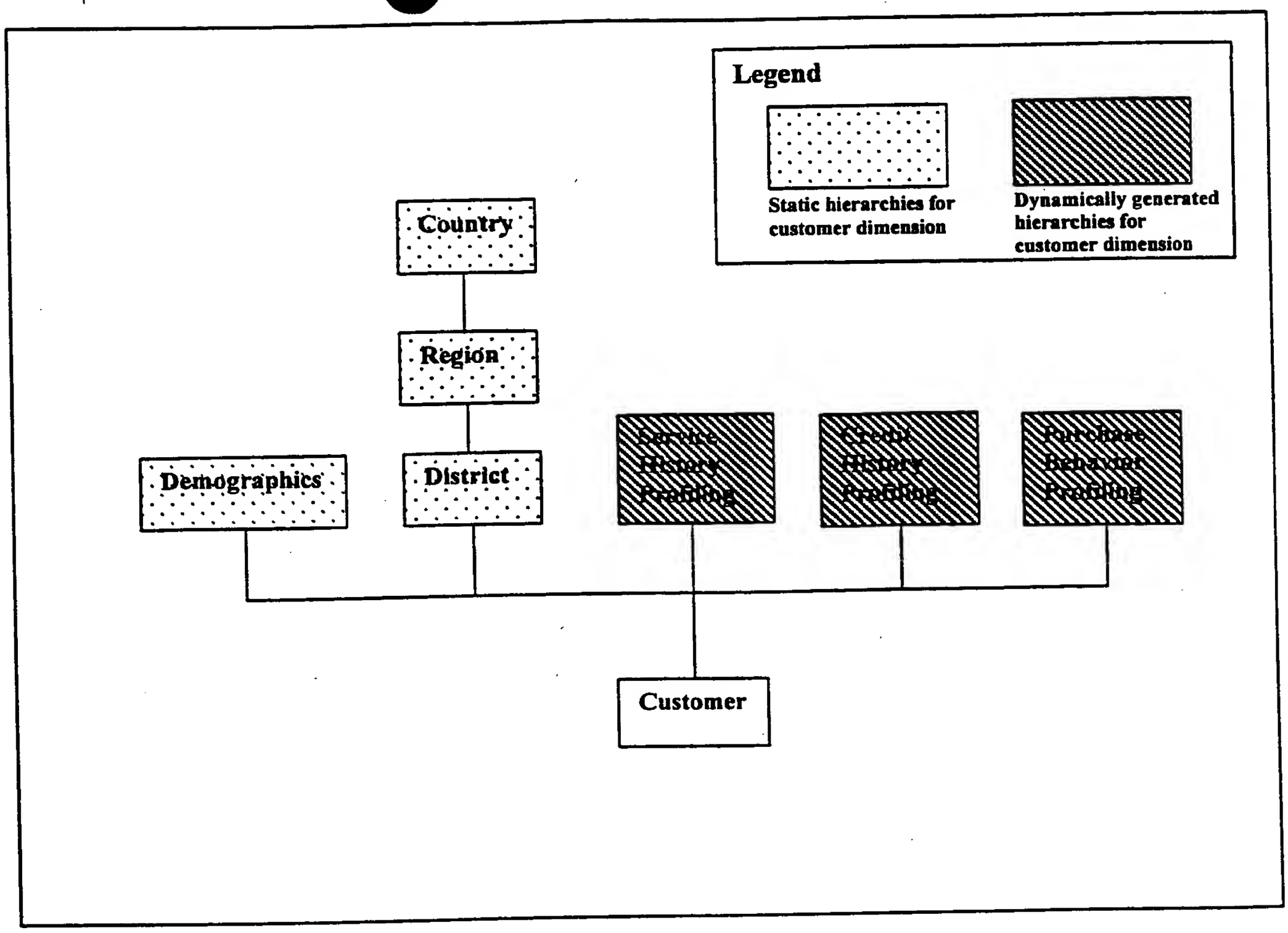

Legend
Static hierarchies for customer dimension
Dynamically generated hierarchies for customer dimension
Country
Region
District
Demographics
Service History Profiling
Credit History Profiling
Foreclosure Behavior Profiling
Customer

Fig. 2D

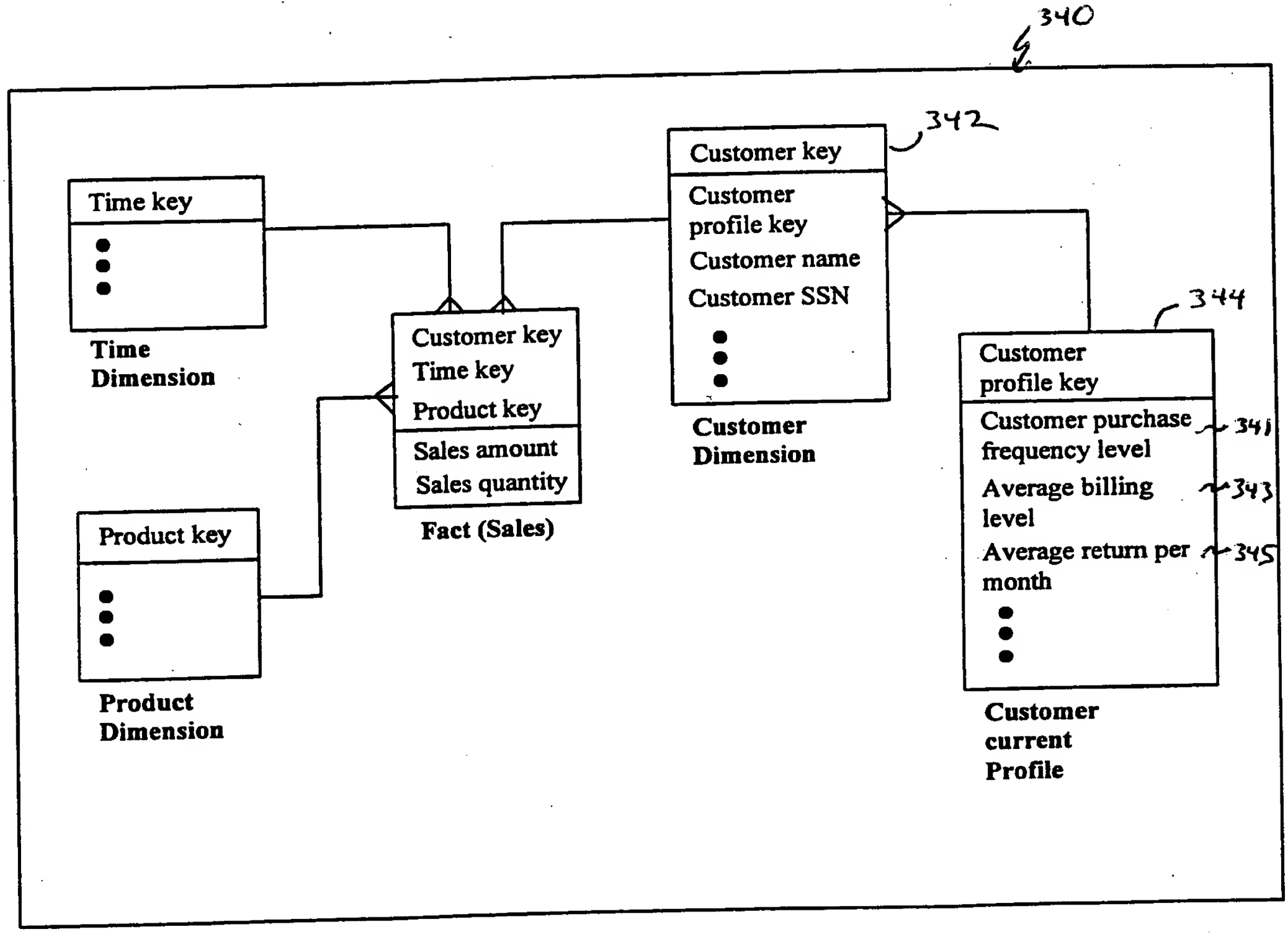

340
342
Customer key
Customer profile key
Customer name
Customer SSN
Customer Dimension
Time key
Time Dimension
Customer key
Time key
Product key
Sales amount
Sales quantity
Fact (Sales)
Product key
Product Dimension
344
Customer profile key
Customer purchase frequency level
341
Average billing level
343
Average return per month
345
Customer current Profile

Fig. 3A

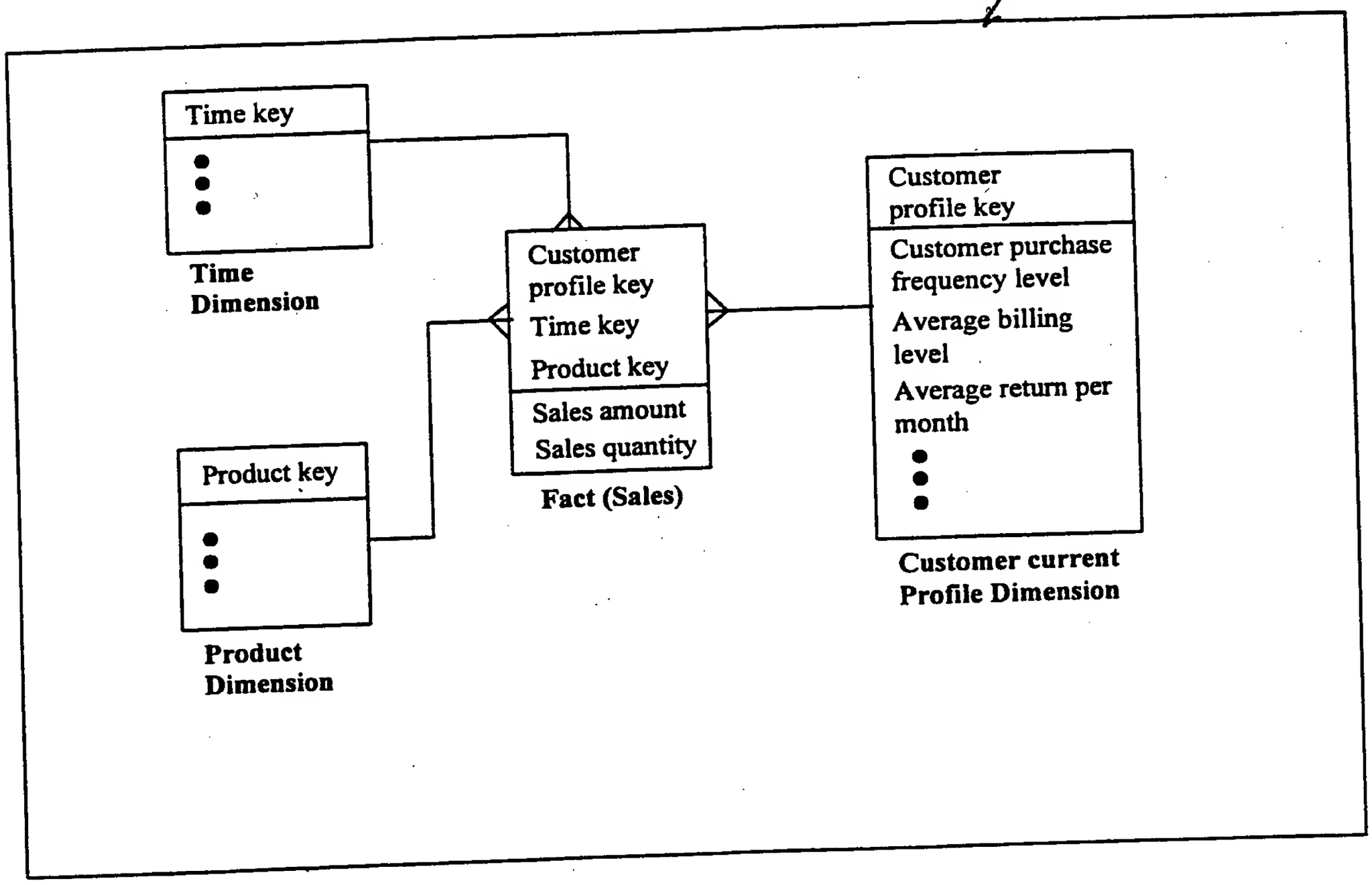

Time key
Time Dimension
Customer profile key
Time key
Product key
Sales amount
Sales quantity
Fact (Sales)
Customer profile key
Customer purchase frequency level
Average billing level
Average return per month
Customer current Profile Dimension
Product key
Product Dimension

Fig. 3B

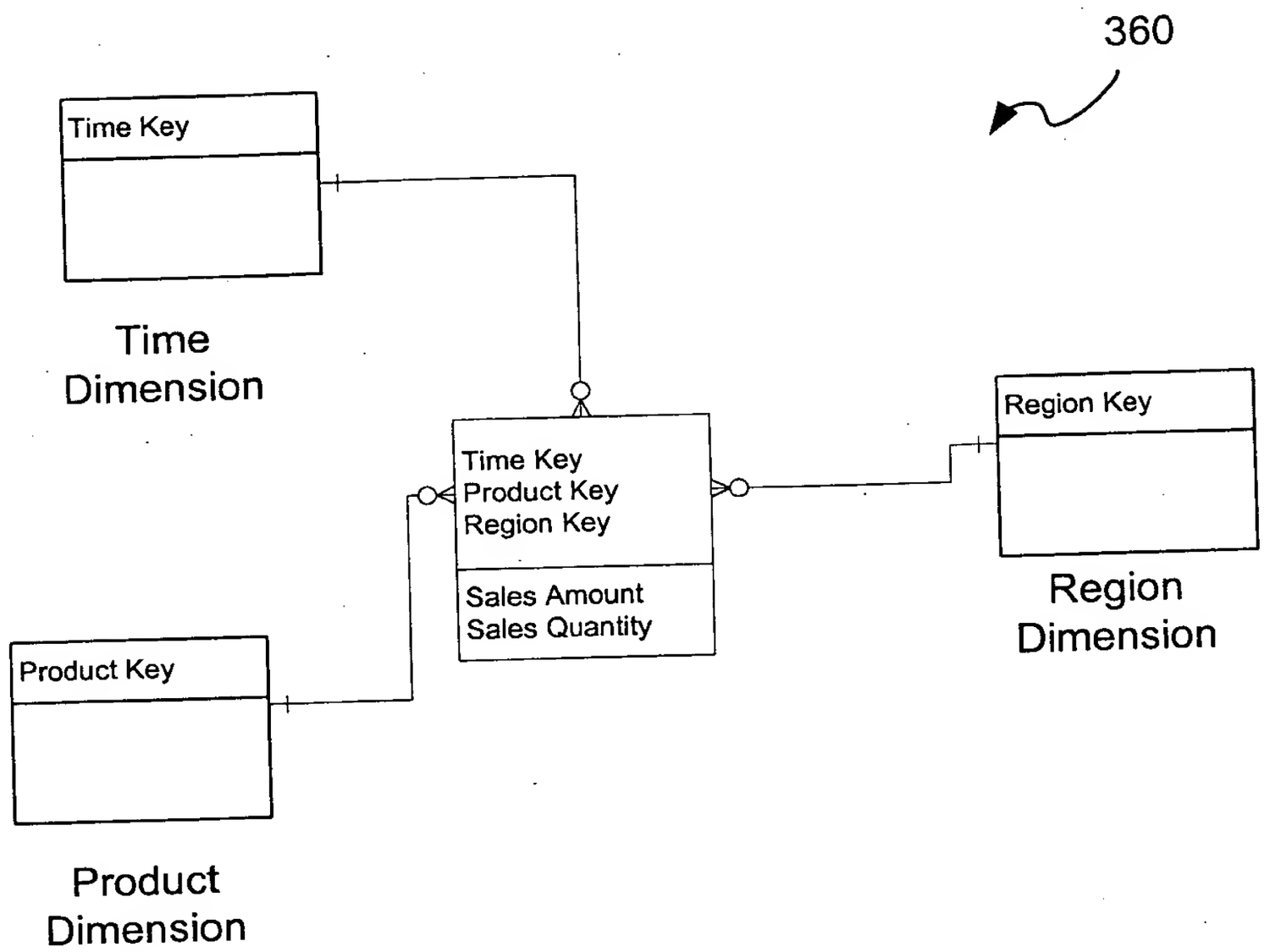

360
Time Key
Time Dimension
Time Key
Product Key
Region Key
Sales Amount
Sales Quantity
Region Key
Region Dimension
Product Key
Product Dimension

Fig. 3C

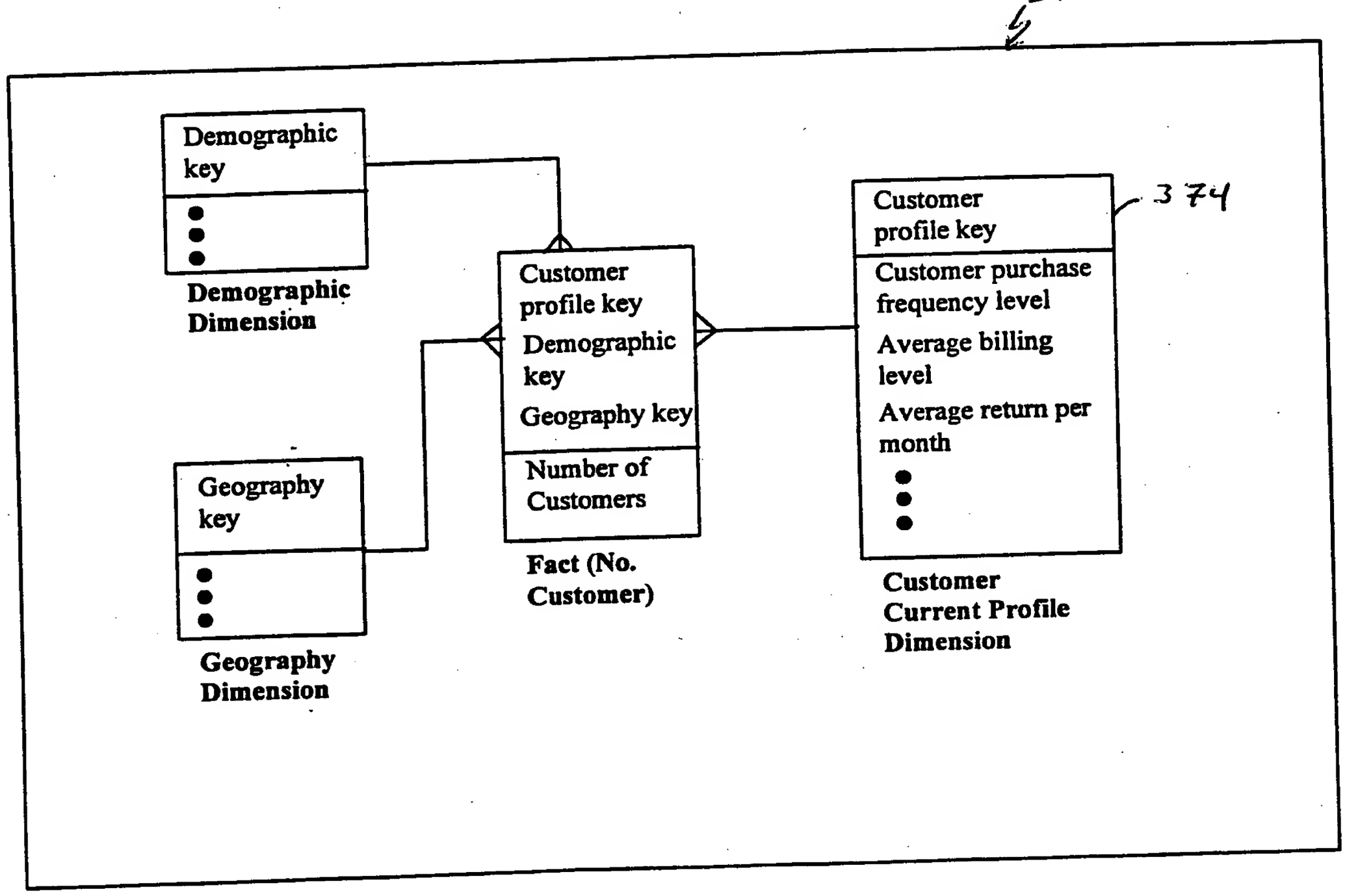

Demographic key
Demographic Dimension
Geography key
Geography Dimension
Customer profile key
Demographic key
Geography key
Number of Customers
Fact (No. Customer)
Customer profile key
Customer purchase frequency level
Average billing level
Average return per month
Customer Current Profile Dimension
374

Fig. 3D

CUBE REPORT EXAMPLES

EX1: DESCRIPTION

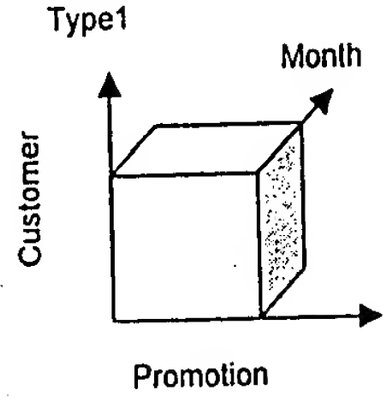
401

Dimensions:	Elements:
.Customer .Time .Promotion	.Customer Name .Month .Promotion
B-measures: Avg. spend amount	Formula: sum(purch_amt) / count(trans)

CUBE TYPE

440

Type1



REPORT LAYOUT

405

		Jan-99		
		Avg. Spend Amt.		
Name	ID	Promo 1	Promo 2	Promo 3
[redacted]				
[redacted]				
[redacted]				
[redacted]				
[redacted]				
[redacted]				
Subtotal Top 100				
Subtotal Rest				

More Months

Fig. 4A

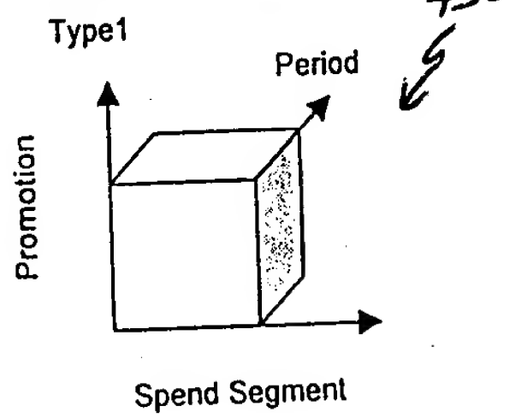
EX2: DESCRIPTION

411

Dimensions:	Elements:
.Customer .Time .Promotion	.Spend Segment .Period .Promotion
B-measures:	Formula:
Avg. spend amount	sum(purch_amt) / count(trans)

CUBE TYPE

450



REPORT LAYOUT

415

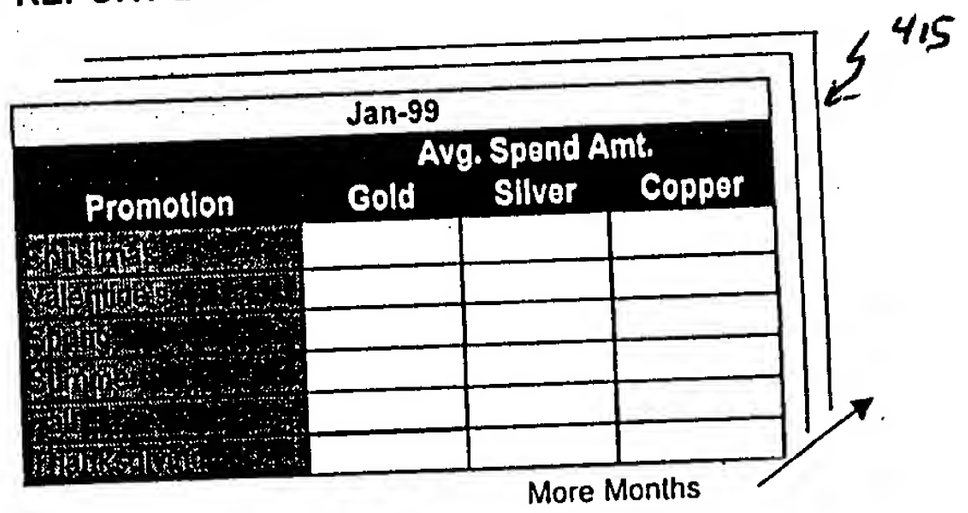


Fig. 4B

EX 3: DESCRIPTION

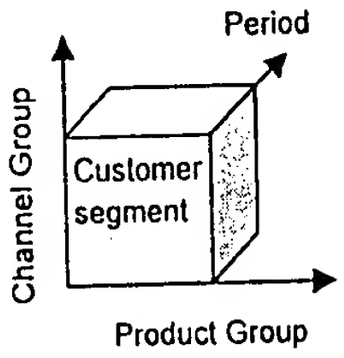
421

Dimensions: .Channel .Product .Time	Elements: .Channel Group .Product Group .Period
B-measures: Sales Contribution	Formula: sum(purch_amt) *filtered* / sum(purch_amt)
Filter Dimension: Customer	Filter Elements: Customer Segment

CUBE TYPE

Type 2

460



REPORT LAYOUT

425

Jan-99			
	Sales Contribution		
Product Group	On-line	Store	Catalog
Books			
Videotapes			
Clothes			
Tidbits			
Cassettes			
Gifts			

Data Set: Customer Segment =1

More Months

Fig. 4C

EX 4: DESCRIPTION

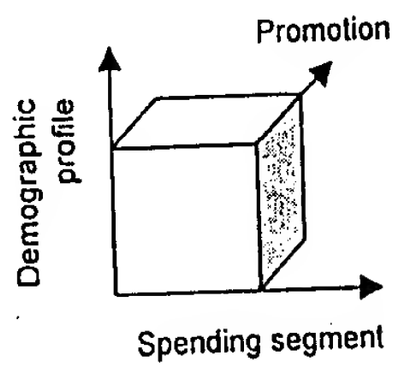
Dimensions:	Elements:
.Customer	.Spend Segment .Demographic Profile
.Promotion	.Promotion
B-measures:	Formula:
Count of Customer	count(cust_key)

431

CUBE TYPE

Type 3

470



REPORT LAYOUT

435

Christmas Promotion				
		Count of customers		
Age Grou	Gender	Gold	Silver	Copper

More Promotions

Fig. 4D

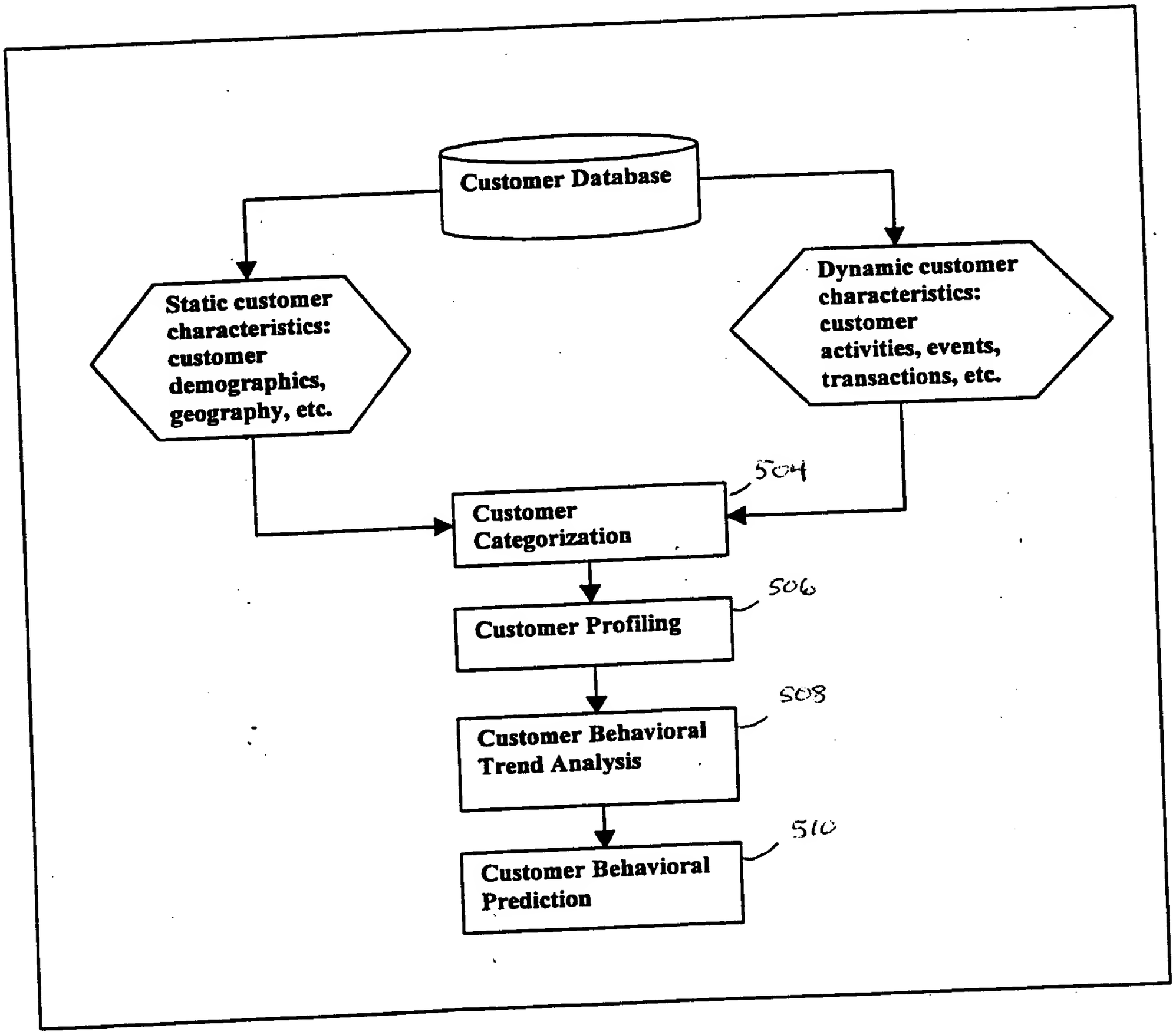

Customer Database
Static customer characteristics: customer demographics, geography, etc.
Dynamic customer characteristics: customer activities, events, transactions, etc.
504
Customer Categorization
506
Customer Profiling
508
Customer Behavioral Trend Analysis
510
Customer Behavioral Prediction

Fig. 5A

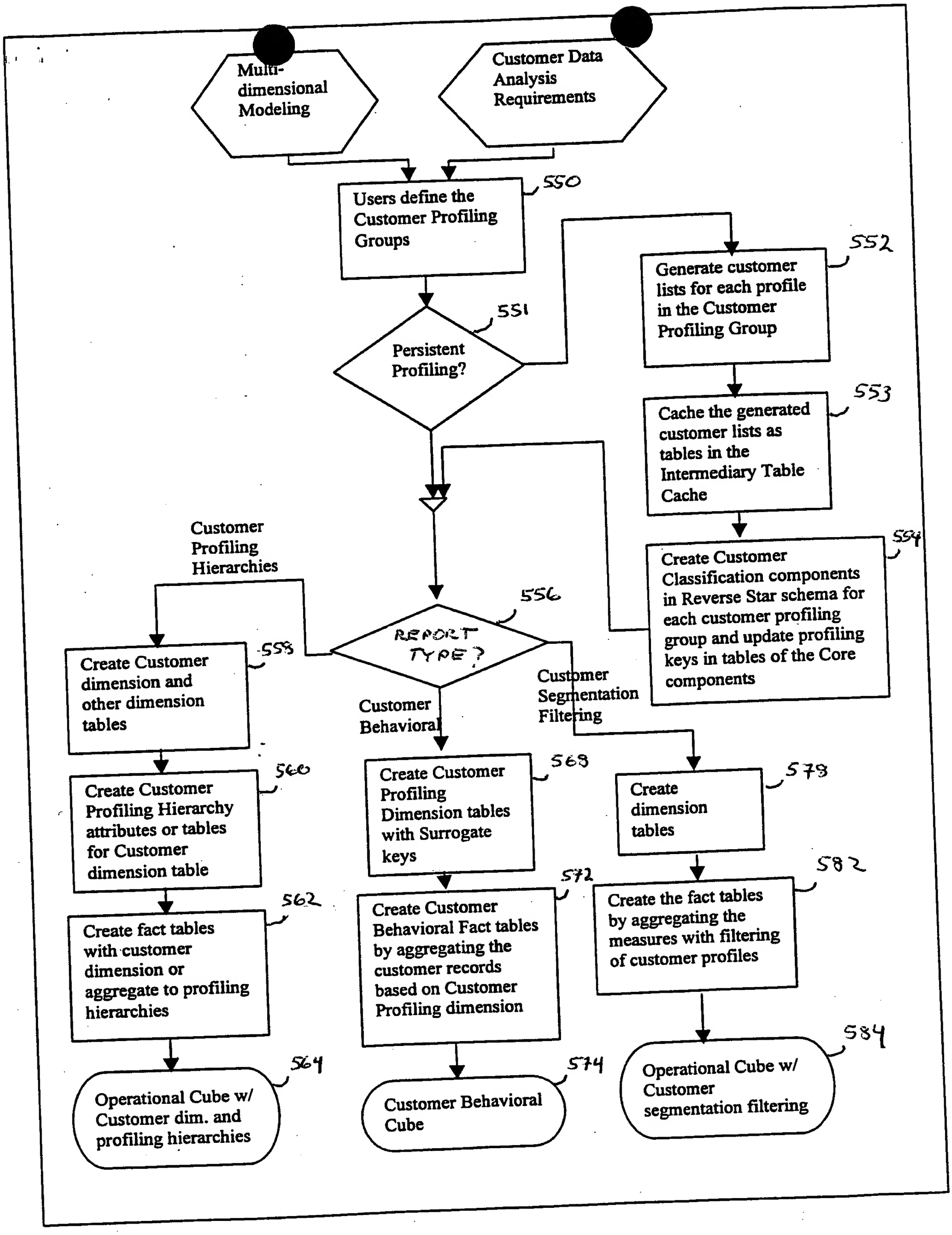

Multi-dimensional Modeling
Customer Data Analysis Requirements
Users define the Customer Profiling Groups
550
Persistent Profiling?
551
Generate customer lists for each profile in the Customer Profiling Group
552
Cache the generated customer lists as tables in the Intermediary Table Cache
553
Create Customer Classification components in Reverse Star schema for each customer profiling group and update profiling keys in tables of the Core components
554
REPORT TYPE?
556
Customer Profiling Hierarchies
Customer Behavioral
Customer Segmentation Filtering
Create Customer dimension and other dimension tables
558
Create Customer Profiling Hierarchy attributes or tables for Customer dimension table
560
Create fact tables with customer dimension or aggregate to profiling hierarchies
562
Operational Cube w/ Customer dim. and profiling hierarchies
564
Create Customer Profiling Dimension tables with Surrogate keys
568
Create Customer Behavioral Fact tables by aggregating the customer records based on Customer Profiling dimension
572
Customer Behavioral Cube
574
Create dimension tables
578
Create the fact tables by aggregating the measures with filtering of customer profiles
582
Operational Cube w/ Customer segmentation filtering
584

Fig. 5B

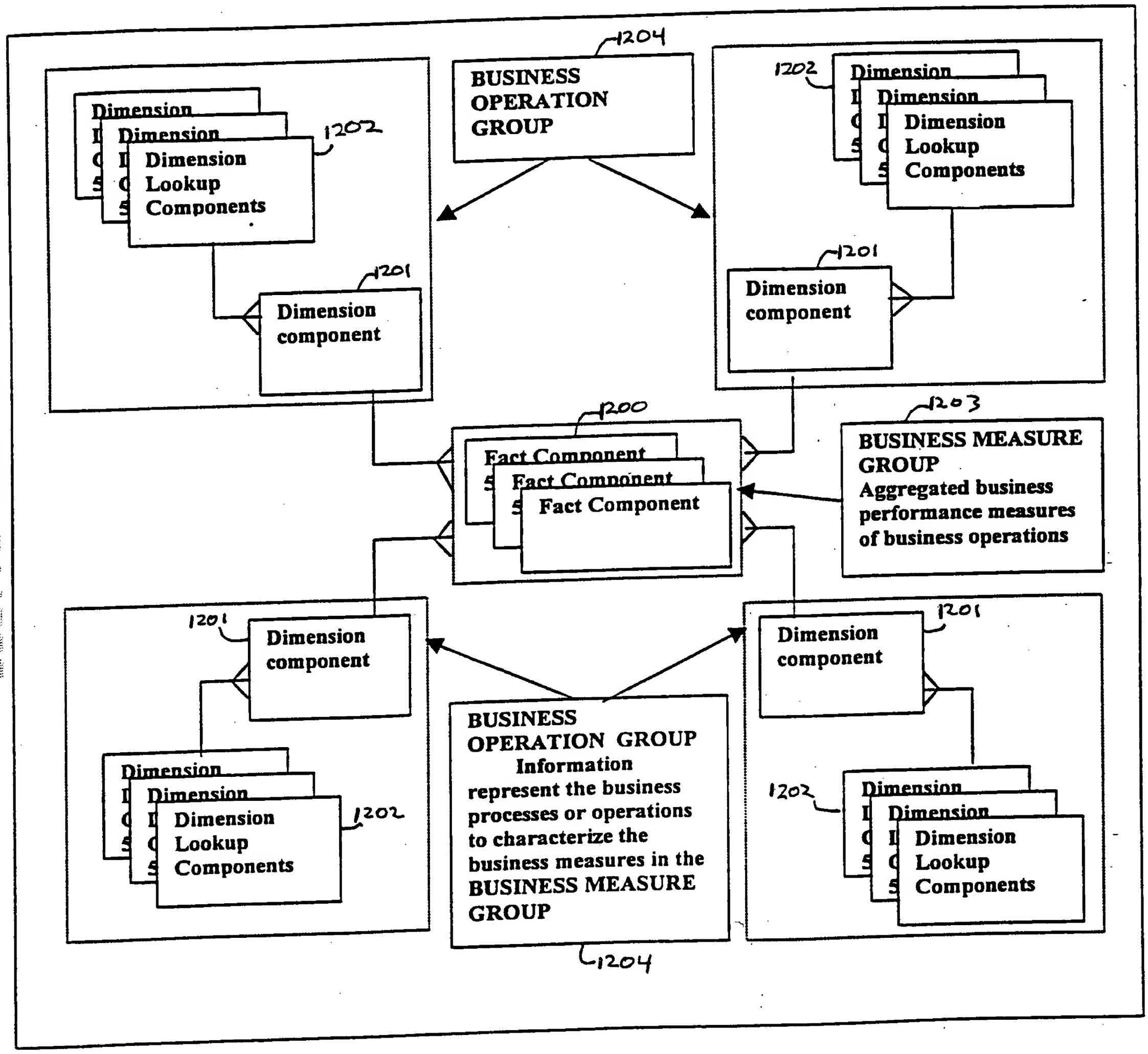

1204
BUSINESS OPERATION GROUP
1202
Dimension
Dimension
Dimension Lookup Components
1201
Dimension component
1200
Fact Component
Fact Component
Fact Component
1203
BUSINESS MEASURE GROUP
Aggregated business performance measures of business operations
BUSINESS OPERATION GROUP
Information represent the business processes or operations to characterize the business measures in the BUSINESS MEASURE GROUP

Fig. 6A

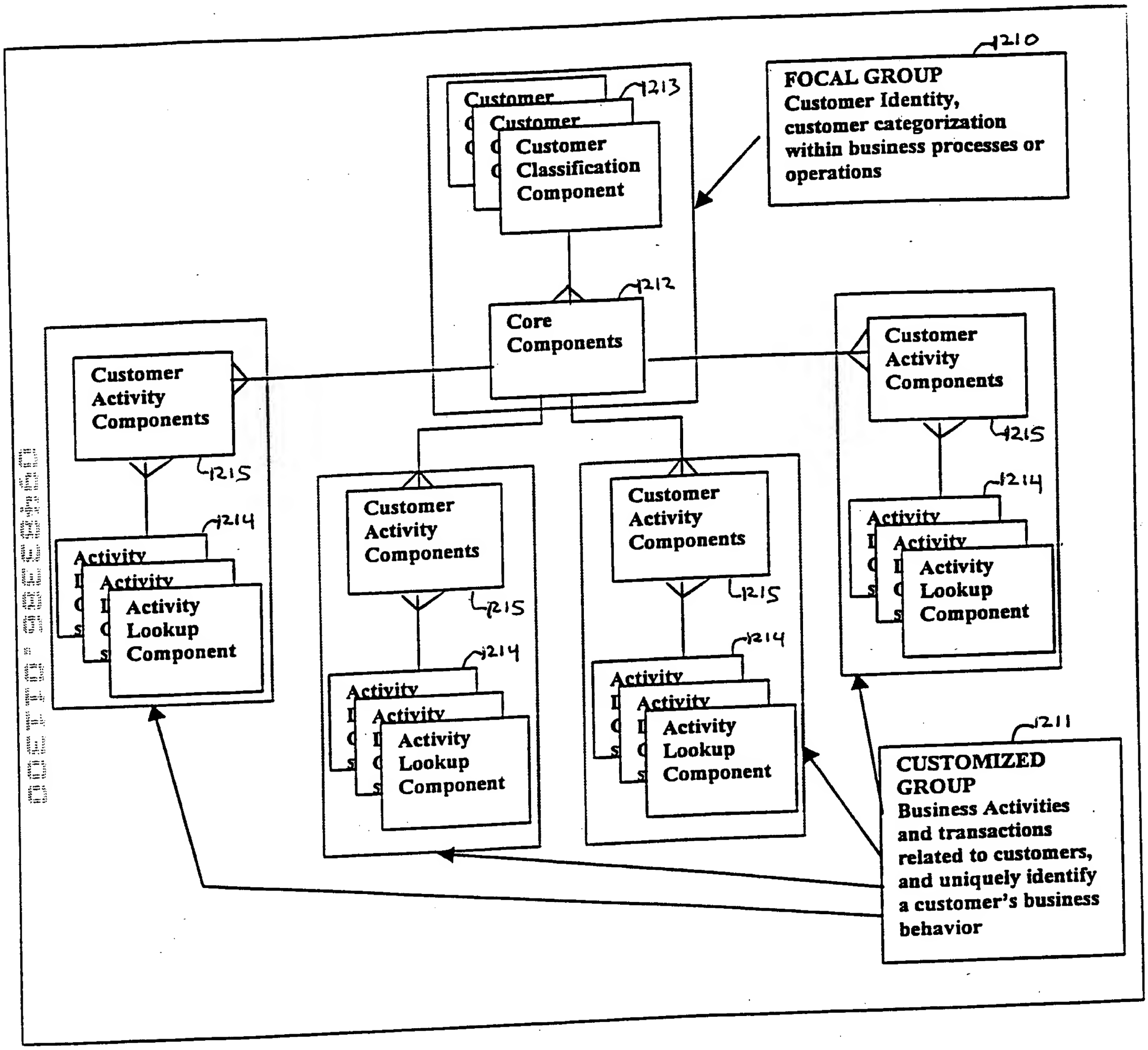

1210
FOCAL GROUP
Customer Identity, customer categorization within business processes or operations
1213
Customer
Customer
Customer Classification Component
1212
Core Components
Customer Activity Components
1215
Activity
Activity
Activity Lookup Component
1214
1211
CUSTOMIZED GROUP
Business Activities and transactions related to customers, and uniquely identify a customer's business behavior

Fig. 6B

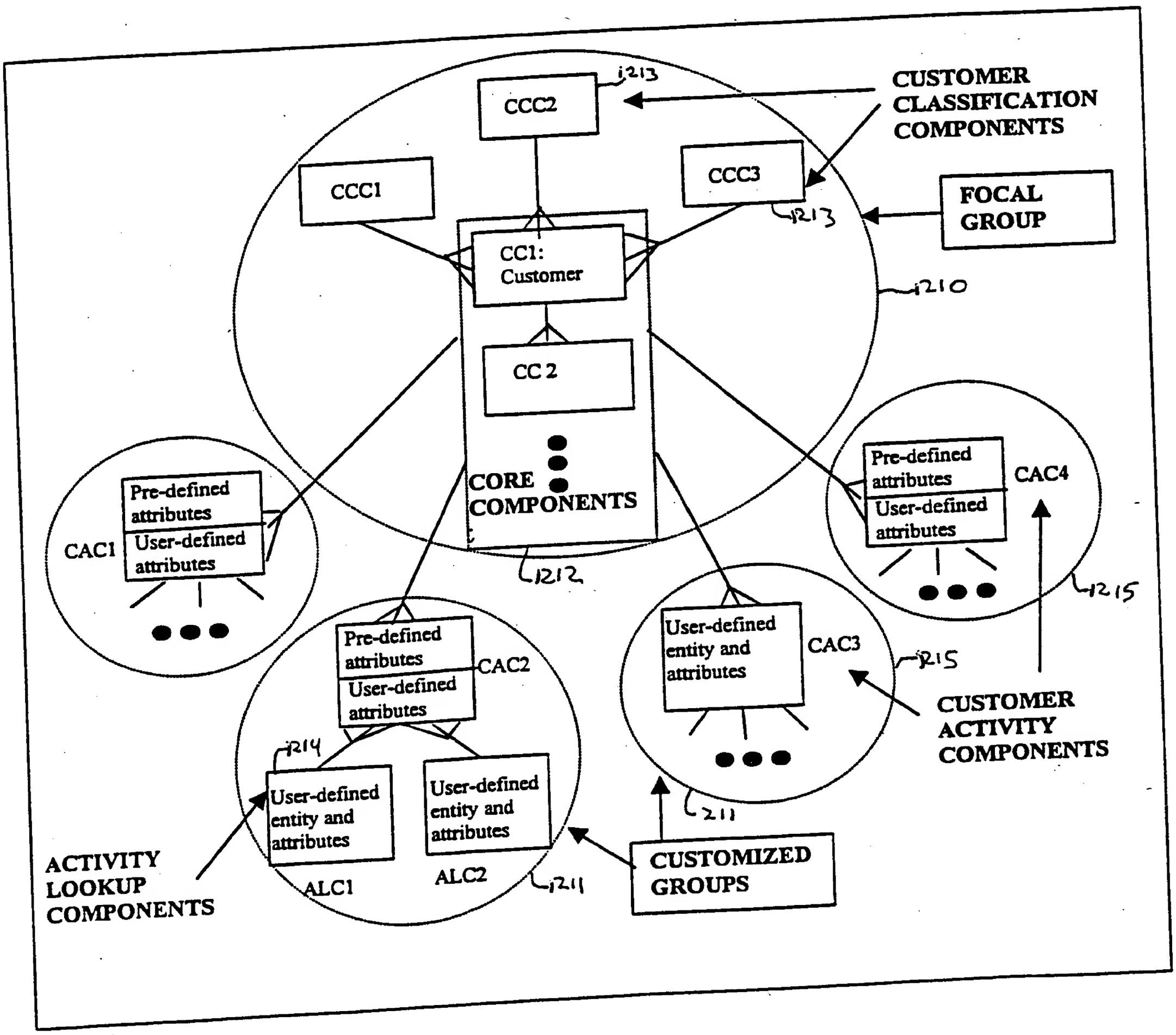

CCC2
1213
CUSTOMER CLASSIFICATION COMPONENTS
CCC1
CCC3
FOCAL GROUP
1213
CC1: Customer
1210
CC 2
CORE COMPONENTS
1212
Pre-defined attributes
User-defined attributes
CAC1
Pre-defined attributes
User-defined attributes
CAC4
1215
Pre-defined attributes
User-defined attributes
CAC2
1214
User-defined entity and attributes
CAC3
1215
CUSTOMER ACTIVITY COMPONENTS
User-defined entity and attributes
ALC1
User-defined entity and attributes
ALC2
1211
ACTIVITY LOOKUP COMPONENTS
CUSTOMIZED GROUPS
211

Fig. 6C

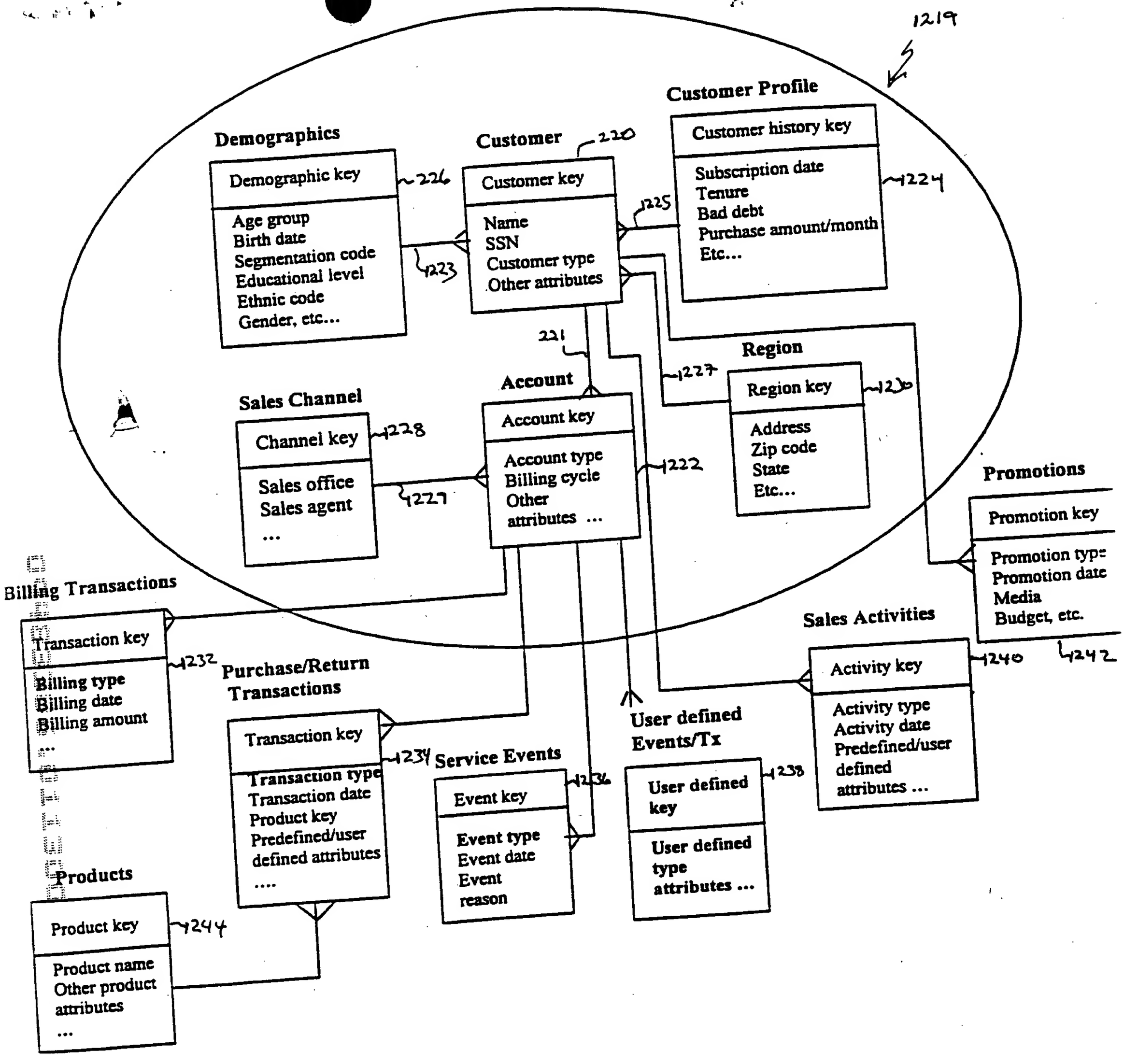

1219
Customer Profile
Customer history key
Subscription date
Tenure
Bad debt
Purchase amount/month
Etc...
1224
Demographics
Demographic key
Age group
Birth date
Segmentation code
Educational level
Ethnic code
Gender, etc...
226
Customer
220
Customer key
Name
SSN
Customer type
Other attributes
1225
1223
221
Region
1227
Region key
Address
Zip code
State
Etc...
230
Account
Account key
Account type
Billing cycle
Other
attributes ...
222
Sales Channel
Channel key
Sales office
Sales agent
...
228
1229
Promotions
Promotion key
Promotion type
Promotion date
Media
Budget, etc.
242
Billing Transactions
Transaction key
Billing type
Billing date
Billing amount
...
232
Purchase/Return
Transactions
Transaction key
Transaction type
Transaction date
Product key
Predefined/user
defined attributes
....
234
Service Events
Event key
Event type
Event date
Event
reason
236
User defined
Events/Tx
User defined
key
User defined
type
attributes ...
238
Sales Activities
Activity key
Activity type
Activity date
Predefined/user
defined
attributes ...
240
Products
Product key
Product name
Other product
attributes
...
244

Fig. 6D